LETTERS TO THE EDITOR.

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A Surface-tension Experiment.

SANS rien vouloir enlever à l'interêt de l'experience d'hydrodynamique signalée par Mr. Baker (p. 196), je crois pouvoir dire qu'elle n'est pas nouvelle, au moins, en tant que phénomène.

Ces sortes de formations de "vasques" liquides etaient très usitées, dans les jardins au XVII^eme^ siècle et nous en rencontrons encore aujourd'hui des exemples dans les parcs où le régime des eaux n'a pas changé depuis cette époque. Pour n'en citer qu'un, que connaissent sans doute beaucoup de vos lecteurs, je rappelerai qu'à Burgos le "paseo del Espalon viejo" possède une fontaine où l'on peut voir une belle réalisation de cette experience. Seulement, là le jet d'eau est dirigé de bas en haut et vient se briser sur un disque placé horizontalement au dessus de lui; puis retombant, il forme autour du tuyau la surface *fermée* si élégante décrite par M. Baker.

Je crois me souvenir que dans un ouvrage publié en 1663 à Nuremberg par George André Boeckler sous le titre "Architectura curiosa nova," il y a de nombreuses planches représentant des jets d'eau d'effets très variés. Peut-être la forme signalée par Mr. Baker s'y trouve-t-elle?

Il serait intéréssant de le vérifier, comme aussi de chercher la figure mathématique de cette surface fermée.

HENRY BOURGET,
de l'Université de Toulouse.

Duration of Totality of Solar Eclipses at Greenwich.

IN NATURE (vol. lxii. p. 64 and p. 86) will be found an estimate of the maximum duration of totality for a solar eclipse under the most favourable conditions, the result being 7m. 40s. for a place in north latitude 4° 52′. For Greenwich I estimate the maximum duration at 5m. 47s. There is good evidence for believing that the "Nautical Almanac" diameter of the moon, used in computing eclipses, is too large. It is almost exactly 2160 miles, and should be reduced probably to 2158 miles. This reduction would alter the above estimates to 7m. 34s. and 5m. 42s. respectively. That all the conditions necessary to produce the maximum totality of 5m. 42s. will ever be simultaneously satisfied for Greenwich is extremely improbable.

Leeds, July 14. CHAS. T. WHITMELL.

THE NEW YORK MEETING OF THE AMERICAN ASSOCIATION.

AT the forty-ninth meeting of the American Association for the Advancement of Science, which was held on June 23-30, at Columbia University, New York City, two experiments were tried. The one was a change of date and the other a somewhat radical change in the character of the meeting. Heretofore, it may be remembered, the American Association has met at about the third week in August, approximately at the same time as the meeting of the British Association. The long summer vacation of the American colleges and universities usually lasts from about the end of June until nearly the beginning of October. It therefore resulted that men engaged in educational work were obliged to interrupt their summers at the seaside or the mountains, to attend the Association meetings. This has been found to be very inconvenient to many on account of the long distances in the States and the widely separated places of meeting. The present year was thought to be a particularly favourable one in which to try a change of date, since many members expected to start for Europe after the close of their college terms, and New York, as the principal port of debarkation, was chosen as the place of meeting for much the same reason.

The other experiment was in the doing away, to a large extent, with the social features and entertainments which had characterised previous meetings. It was distinctly understood that no entertainment fund would be raised in New York, and that the Association would pay its own expenses. It was, therefore, a more distinctively working scientific meeting than has been held before. The attendance was not large, and only 450 members registered. Fifteen affiliated societies held their meetings at the same time, including several which have heretofore not affiliated themselves with the older society. These were the American Mathematical Society, the American Physical Society, and the American Psychological Association. The other societies in attendance were the American Forestry Association, the Geological Society of America, the American Chemical Society, the Society for the Promotion of Agricultural Science, the Association of Economic Entomologists, the Botanical Society of America, the Society for the Promotion of Engineering, Education, the American Folk-Lore Society, and the American Microscopical Society.

The session was opened by the retiring President, Mr. G. K. Gilbert, who was elected at the December meeting of the Council to fill the vacancy caused by the death of Dr. Edward Orton last autumn. Mr. Gilbert introduced the incoming President, Prof. R. S. Woodward, of Columbia University, who thereafter presided over all the general sessions of the Association. A cordial and eloquent address of welcome was made by Mr. Seth Low, President of Columbia University; and Mr. James Wilson, the Secretary of Agriculture in President McKinley's Cabinet, upon being invited to address the Association, made a strong plea for applied science. On Tuesday afternoon the addresses of five of the Vice-Presidents were given, the other four being postponed until next year.

Vice-President Asaph Hall, junr., addressed the Section of Mathematics and Astronomy on the teaching of astronomy in the United States. Prof. Hall urged that elementary astronomy should be taught in the high schools and preparatory schools as well as in the colleges. Elementary astronomy he defines as meaning such part of the science as can be learned by an intelligent student without mathematical training. He advocated the study of the history of astronomy as a culture study in the colleges, showing that the earliest religious festivals depended upon astronomical observations. An interesting feature of this historical side would be the philosophical study of the different theories of the universe. He advocated the more general teaching of spherical astronomy and the elements of celestial mechanics, and showed that during the past twenty years great advances in astronomical teaching have been made in the States. In his opinion the best equipped observatory for teaching purposes is at Princeton, and the theses in practical astronomy produced in America compare favourably with those presented in Germany and France.

Vice-President Merritt addressed the Section on Physics on the subject of "Kathode Rays and some Related Phenomena," referring to the various views which have been advanced concerning the nature of the kathode rays, and the general adoption of the Crookes' theory of electrified particles. He gave an account of the progress made during the last ten years, and discussed recent experiments concerning the size of the ray particles and the speed at which they travel. Minor difficulties in the present theory were pointed out, and the probable direction of further progress was indicated. Lantern views were shown illustrating various vacuum tube phenomena related to kathode rays.

The address of Vice-President Howe before the Section of Chemistry was on the subject, "The Eighth Group of the Periodic System and some of its Problems." It was pointed out that in the early work of Newlands and of Mendeléeff, which subsequently developed into the periodic law, a serious difficulty was met with in dealing with iron, cobalt, nickel, and the metals of the platinum group.

In his first summing up of the principles of the periodic law in 1869, Mendeléeff concludes that "elements which are similar as regards their chemical properties have atomic weights which are either of nearly the same value (*e.g.* platinum, iridium, osmium) or which increase regularly (*e.g.* potassium, rubidium, cæsium)." So in most schemes for representing the periodic system, each triplet of these elements is considered as a single element, and because even then they do not seem to fall into regular periodic arrangement, they are cast out, Ishmael-like, into an anomalous eighth group. This is doubtless the reason they have been relatively so much neglected by chemists, and possibly it is not incorrect to say that the chemistry of these metals is less known than that of any other group of well characterised elements. Yet there are certainly no nine nearly related elements which present so many interesting chemical problems, the solution of which will so much further our knowledge of chemistry in general. Prof. Howe dealt in detail with this eighth group and some of its many problems.

The ordinary division of these nine metals is into three groups, viz., the common metals, iron, cobalt and nickel, with an atomic weight of from 56 to 59 and a specific gravity of 7·8 to 8·9; the lighter platinum metals, ruthenium, rhodium and palladium, with an atomic weight 101·5 to 106·5 and a specific gravity of about 12; and the heavy platinum metals, osmium, iridium and platinum, of atomic weight 191 to 195 and specific gravity 21·5 to 22·5. These nine metals are held to fulfil every definition of an element, and are just as much to be looked upon as simple elementary substances as any of those substances which are called elements. Though refined determinations may change, to a slight extent, the atomic weights of some of these elements, especially those of ruthenium and osmium, the weights of these elements relative to each other, and hence their position in the periodic system, will probably remain unchanged. This carries with it the conclusion that in the periodic table an element may have an atomic weight slightly lower than that of the element which precedes it.

Reference was made to the natural grouping of the elements of the eighth group into three triplets, iron, ruthenium, osmium; cobalt, rhodium, iridium; and nickel, palladium, platinum. That this is a natural grouping is attested by a comparison of the compounds of these metals. However, in considering now some of these compounds, the evidence of this grouping is only incidentally presented; Prof. Howe directed attention to some of the more unusual of these compounds, especially with reference to problems which this group presents, and to problems of other groups, suggested by the chemistry of this group.

Vice-President Kemp, before the Section of Geology and Geography, spoke upon the "Pre-Cambrian Sediments in the Adirondacks." He showed that the Adirondack area of ancient crystallines in Northern New York covers about 12,000 square miles. It has long been known that in the gneisses and eruptive rocks which constitute it, crystalline limestones of undoubted sedimentary origin occur in many places. The address presented the results of the work of the last ten years upon these sediments. It has been recently learned that ancient sandstones are also present, and many gneisses, which are doubtless altered shales. The crystalline limestones are in greatest individual areas in the north-west, where the belts have been shown to be from twenty to thirty-five miles long and from two to six miles broad; but they are most numerous on the east, where the speaker has now located over fifty different localities of relatively thin beds. In their structural relations these narrow beds on the east are interstratified with the gneisses, and are more especially associated with fragmental sediments. From these relations the argument is drawn that the sediments were extensive, that they involved more limestone on the west and more sandstone and shale on the east, and that many gneisses represent former shales. It was further shown that these strata are profoundly metamorphosed, and in such a way that the changes must have been produced while the rocks were under a heavy over-lying load, and were deeply buried. Evidence was brought forward to prove that this burden consisted of pre-Cambrian rocks. The speaker said that, inasmuch as there are abundant eruptive rocks present of a coarsely crystalline type, which were likewise produced under deep-seated conditions, it is assumed that they represent the deeper rocks of an old and very extensive volcanic area, whose tufas and lavas built up the burden of pre-Cambrian rocks, which have now disappeared, and which made possible the metamorphosis of the ancient sediments.

Vice-President Trelease, before the Section of Botany, delivered an address under the title, "Some Twentieth Century Problems," passing in review the great utilitarian development of botanical science during the present century, and indicating its probable greater advancement along utilitarian lines during the next hundred years. He made a general statement of the great problems to be met and solved, and considered in detail the necessity and means of co-operation in the treatment of species and their nomenclature, and in details of publication which are becoming daily of more evident importance for the greatest possible advancement of science. In conclusion he made a strong plea for the establishment of a Government Reservation in the Redwood (*Sequoyia sempervirens*) Forests in California, not only as a means of preserving a forest growth which can never be reproduced, but as furnishing the means of solving many problems closely connecting biology and meteorology, which may ultimately be of the greatest economic utility.

The address of the retiring President, Mr. G. K. Gilbert, was delivered on Tuesday evening at the American Museum of Natural History. His subject was "Rhythms and Geologic Time." This address appears in another part of the present number of NATURE.

The programmes of the sectional meetings were very full, and the discussions in the sections of mathematics and astronomy, physics, chemistry and botany were especially animated and prolonged.

Several important matters were decided upon by the Council. Perhaps that of the greatest general interest to members of the Association was the decision to try the experiment during the year beginning January 1, 1901, of publishing all official notices and proceedings of the Association in the journal *Science*, and of sending that journal to all members of the Association at the expense of the Association itself, and without charge to members beyond their annual dues. This will not make *Science* precisely the official organ of the Association, since the management and the editor will remain as before, and the Association will have no strict supervision of the conduct of the journal. The annual volume of proceedings will be reduced during that year, and possibly for future years, should the experiment prove a success, to a business record of the affairs of the Association, including lists of members and fellows, the text of the constitution, and possibly a list of the papers presented at the meetings.

Amendments to the constitution were adopted, establishing a new section of Physiology and Experimental Medicine (Section K), and lengthening the term of office of the Treasurer of the Association from one year to five. A discussion of the new International Association for the Advancement of Science, Art and Education was introdnced, and conservative action was taken which simply expressed approval of the idea of international co-operation in the field of science, and promised to designate a delegate to a national conference having that end in view.

Grants were made to the Committee on Anthropometric Measurements; to the Committee on the Quantitative Study of Biological Variation; to the Committee on the Study of Blind Vertebrates; and to the Committee on Study of the Relation of Plants to Climate. The last two committees were established at this meeting. The one on Blind Vertebrates consists of Mr. Theodore N. Gill (chairman), Messrs. A. S. Packard, C. O. Whitman, S. H. Gage, H. C. Bumpus and C. H. Eigenmann. The one on Relation of Plants to Climate consists of Messrs. Wm. Trelease, D. T. MacDougall and J. M. Coulter.

Resolutions were adopted urging upon the Government of the United States (1) the establishment of a bureau of standards in connection with the U.S. Office of Standard Weights and Measures; (2) the establishment of a Government Reservation in the Primeval Redwood Forest, situated in the Santa Cruz Mountains in California; and (3) the establishment of a Government Reservation in some portion of the hard wood forests of the Southern Appalachian region.

At the meeting of the General Committee held on the evening of the June 28, the city of Denver, Colorado, was chosen as the place for the next meeting, and the time selected was the week ending August 31. The choice of Pittsburg, Pa., as a meeting place in 1902 was recommended by formal resolution.

On the same evening the following officers for the ensuing year were elected:—For President, Prof. Charles Sedgwick Minot, of the Harvard Medical School; for Vice-Presidents, as follows:—Section A, Mathematics and Astronomy, Prof. James MacMahon, of Cornell University; Section B, Physics, Prof. D. T. Brace, of the University of Nebraska; Section C, Chemistry, Prof. John H. Long, of the North-western University; Section D, Mechanical Science and Engineering, Prof. H. S. Jacoby, of Cornell University; Section E, Geology and Geography, Prof. C. R. Van Hise, of the University of Wisconsin; Section F, Zoology, Prof. D. S. Jordan, of Stanford University; Section G, Botany, Mr. B. T. Galloway, of the U.S. Department of Agriculture; Section H, Anthropology, Mr. J. Walter Fewkes, of the Bureau of American Ethnology; Section I, Social and Economic Science, Mr. John Hyde, Statistician, U.S. Department of Agriculture. General Secretary, Prof. Wm. Hallock, Columbia University; Secretary to the Council, Dr. D. T. MacDougall, New York Botanical Gardens.

THE WELLCOME RESEARCH LABORATORIES.

IT is a remarkable sign of the times when the head of a firm principally distinguished for the introduction into this country of American methods of dealing with drugs, *i.e.* by putting them up in new and convenient shapes and doses, goes out of his way to fit up extensive research laboratories. This is what Mr. Wellcome has done. In 1896 laboratories were established in the business premises of the firm in Snow Hill. Now, after four years, during which the work continued to grow, it has been found necessary to give a complete house to the department. A well-built modern house has been secured at No. 6 King Street, Snow Hill, and has been converted into a series of three commodious and well-fitted laboratories, a library and office, and a store-room and workshop-laboratory. Each laboratory is self-contained, and each is connected with the other and with the directors' office by means of telephones. The basement contains a good-sized electric motor, and a dark room for polarimetric and photographic work. Use has been made of the electric mains to heat radiators for the distillation of ether, benzene and other inflammable liquids. The whole is under the direction of Dr. T. B. Power, F.I.C., who has a staff of four assistants, all men who have been carefully selected for their attainments and skill in actual research.

Mr. Wellcome is to be congratulated on his enterprise. His firm, considering the nature of their business, might well have acted on the supposition that research was not strictly within their province. They might have argued, "Research is the business of the drug manufacturer and the manufacturing chemist; it does not concern the compounder of medicines." Their success in former years is a solid argument in favour of such a view, which can be very easily strengthened by a consideration of the success of many firms who have pursued an exactly similar line of business.

Mr. Wellcome intends to carry on his laboratories in no narrow spirit; this means, I presume, that he has other views than the conversion of his business into a chemical manufacturing concern. Though much work is done towards the perfection of the firm's preparations, time has been found for several researches which have been published, and other work of this kind is in hand. At present the bulk of the work is carried out on the natural drugs, very little having been undertaken in the direction of investigations leading to the discovery or further knowledge of the properties of artificial medicinal substances. There is undoubtedly a vast field in the direction so far pursued, but every one must hope that the other will not be neglected, and that at length this country may make a contribution to the number of substances of medicinal value derived directly and not through the medium of plant or other life from the carbon compounds of the aromatic series.

The laboratories were informally opened on June 18, when at Mr. Wellcome's invitation a number of gentlemen interested in science, together with some representatives of the Press, were received by Dr. Power and conducted over the building. All interested in the advance of chemistry, whether pure or applied, will wish Mr. Wellcome success, and also that he may find imitators among the numbers of firms who are meditating an advance in the direction of a more scientific method of conducting their manufactures. R. J. FRISWELL.

NOTES.

IN the House of Commons on Tuesday, Mr. Goschen announced that a committee of experts would be appointed to inquire into the efficiency of water-tube boilers in actual operation in different types of ships of H.M. Navy.

THE Additional Estimate for the Navy for the year 1900–1901 includes 9500*l.* for wireless telegraphy apparatus; 3600*l.* for telescopic sights for quick-firing guns; and 16,500*l.* for gyroscopes for Whitehead torpedoes.

THE scientific congresses to be opened in connection with the Paris Exposition during the present month are:—July 19–25, applied mechanics; July 23–28, applied chemistry; July 19–21, naval architecture and construction; July 28–August 3, navigation; July 28–August 4, chronometry; July 23–28, photography; July 18–21, homœopathy; July 23–28, professional medicine; July 27–29, medical press; July 27–August 1, electrology and medical radiology.

WE have been notified that the title of the subject for discussion at the joint meetings of the Institution of Electrical Engineers and the American Institute of Electrical Engineers to be held in the American Pavilion in the Paris Exhibition on the morning of Thursday, August 16, is "The relative advantages of alternate and continuous current for a general supply of electricity, especially with regard to interference with other interests." We understand it is specially desired to discuss how